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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,502	09/01/2006	Yuichiro Nakamura	OGOSH60USA	6549

270 7590 12/22/2009

HOWSON & HOWSON LLP
501 OFFICE CENTER DRIVE
SUITE 210
FORT WASHINGTON, PA 19034

EXAMINER	
SHEVIN, MARK L	

ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
12/22/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

Office Action Summary	Application No.	Applicant(s)	
	10/598,502	NAKAMURA ET AL.	
	Examiner	Art Unit	
	MARK L. SHEVIN	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4 and 11-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4 and 11-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement of RCE

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 5th, 2009 has been entered.

Status of Claims

2. Claims 1, 4, and 11-17, filed October 5th, 2009 are pending. Claims 13 and 17 are amended and claims 2-3 and 5-10 are canceled.

Status of Previous Rejections

3. The previous rejection of claims 1 and 13-16 under 35 U.S.C. 103(a) over **JP '623** (JP 2002-069623 – Machine translation) in the Office action dated June 3rd, 2009 has been withdrawn in view of Applicants' remarks filed October 5th, 2009 at p. 8, para 4.

4. The previous rejections of claims 4, 12, and 17 under 35 U.S.C. 103(a) over **JP '623** in view of **JP '125** (JP 2002-208125 – Machine translation), **Yamakoshi** (US 6,153,315), and **Kano** (US 5,460,793) in the Office action dated June 3rd, 2009 have been withdrawn in view of Applicants' remarks filed October 5th, 2009 at p. 8, para 4.

5. The previous rejection of claim 11 under 35 U.S.C. 103(a) over **JP '623** in view of **JP '125 Yamakoshi,** and **Kano**, in further view of **Hatwar** (US 4,895,592) in the Office

action dated June 3rd, 2009 has been withdrawn in view of Applicants' remarks filed October 5th, 2009 at p. 8, para 4.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

6. **Claims 1 and 13-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bartholomeusz** (US 6,521,062).

Bartholomeusz:

Bartholomeusz is drawn to the production of cobalt-base alloy sputtering targets (claims 1 and 12 and 13 and col. 2, lines 50-58) with primary elemental additions of Cr, Pt, Ni of 0 – 30 at% and secondary elemental additions such as Ta, B, Nb, Sm, Fe, Si, Zr, W, Mo, V, Hf, and Ti of 0 – 30 at%, such as alloys comprising Co, Cr, Pt, and B (claims 7, 8, 17, 18, and 19).

Such cobalt-base alloys can be very difficult to roll if the concentration of limited solid-solubility elements is excessive (col. 1, lines 19-30). As more Ta and B are added to the Co-Cr-Pt-B-Ta matrix studied by Bartholomeusz, the intermetallic precipitates became less dispersed and more continuous as expressed by the metric (continuity) of volume percent discontinuous intermetallic phases divided by the number of free nodes of these phases (col. 3, lines 58-65).

Beyond a certain continuity, continuous and brittle intermetallic phase networks form leading to fracturing during hot-rolling due to ready crack propagation along the intermetallic network (col. 3, line 65 to col. 4, line 4).

Bartholomeusz solves this problem of brittle interconnected intermetallics by casting and rolling to produce grain sizes of about 20 μm and precipitate sizes of about 1 μm (col. 4, lines 4-13). His process is embodied in claim 1 and col. 5, line 60 to col. 6, line 5 and yields average product grain sizes of less than 100 μm, average product precipitate size of less than 50 μm, with no significant through thickness grain-size or precipitate size gradient, theoretical density, high pass through flux of greater than 20%, and substantially homogenous microstructural (col. 6, lines 14-25 and claim 1).

Regarding claim 1, Batholomeusz discloses sputtering targets (claims 1 and 12 and 13 and col. 2, lines 50-58) of at least Co, Cr, Pt, and B (claims 7, 8, 17, 18, and 19) having a target surface prepared by melting and rolling (col. 6, lines 14-25 and claim 1) in which intermetallic compounds or other substances without ductility exist (col. 3, line 65 to col. 4, line 4 and col. 4, lines 4-13.

With respect to the average particle diameter of at least 0.5 μm to 50 μm, Bartholomeusz teaches that the average product precipitate size produced by his method is less than 50 μm (col. 6, lines 14-25), which overlaps the claimed range.

With respect to the limitation of "wherein defects of 10 μm or more resulting from machine work do not exist", Bartholomeusz does not state the presence of surface defects nor the presence of machining work on a final product that would produce

“defects of 10 μm resulting from machine work” thus the prior art meets the limitation of "wherein defects of 10 μm resulting from machine work do not exist.”

However Bartholomeusz is silent with respect to the presence of oxides, carbides, and carbonitrides, the matrix being a highly ductile phase, the volume percentage of precipitates of 1% to 50%, the Vickers hardnesses of the matrix and other substances without ductility and the attendant hardness difference of the two.

From the instant specification, the instant target with the features of oxides, carbides, and carbonitrides, the matrix being a highly ductile phase, the volume percentage of precipitates of 1% to 50%, the Vickers hardnesses of the matrix and other substances without ductility and the attendant hardness difference of the two is manufactured by dissolution and rolling (p. 7, lines 15-20, p. 9, lines 1-6 and 17-22) - (cutting with a lathe and latter polishing do not form the claimed sputtering target precipitate structure of claim 1). Dissolution is considered to be casting.

Bartholomeusz’s sputtering targets are of a substantially similar composition (comprising Co, Cr, Pt, and B) and are produced by a substantially similar process in being cast (col. 5, lines 60-65) and then rolled (col. 6, lines 3-5).

Thus, one of ordinary skill in sputtering target manufacturing would have reasonably expected that Bartholomeusz produces Co-Cr-Pt-B sputtering targets that meet the claimed limitations of claim 1 regarding the presence of oxides, carbides, and carbonitrides, the matrix being a highly ductile phase, the volume percentage of precipitates of 1% to 50%, the Vickers hardnesses of the matrix and other substances

without ductility and the attendant hardness difference of the two because Bartholomeusz's sputtering targets are of a substantially similar composition (comprising Co, Cr, Pt, and B) and are produced by a substantially similar process in being cast (col. 5, lines 60-65) and then rolled (col. 6, lines 3-5).

Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best,* 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada,* 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Furthermore, from MPEP 2112, para. V, subpara 1: "[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on 'inherency' under 35 U.S.C. 102, on '*prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same..." The burden of proof is similar to that required with respect to product-by-process claims. *In re Fitzgerald,* 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting *In re Best,* 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). See MPEP 2112.

Furthermore, It would have been obvious to one of ordinary skill in sputtering target manufacturing, at the time of the invention, to select any portion of the claimed range of average precipitate size, including the claimed range, from the overlapping

range disclosed in Bartholomeusz because Bartholomeusz finds that the prior art composition in the entire disclosed range has a suitable utility and the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). From MPEP § 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

With respect to claims 13-16, these claims are rejected for the same reasons as stated for claim 1 above.

With respect to the amendment to claim 13 adding that "…said surface provides a flat and smooth target face without undulation", the prior art of Bartholomeusz would similarly be expected to have a "flat and smooth target face without undulation" as Bartholomeusz is produced by a substantially similar process including casting and rolling and such rolling would be expected to give a flat and smooth surface without undulation.

7. **Claims 4, 12, and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bartholomeusz** as applied to claims 1 and 13-16 above, in view of **JP '125** (JP 2002-208125 – Full human translation), **Yamakoshi** (US 6,153,315), and **Kano** (US 5,460,793).

The disclosure of Bartholomeusz was discussed in the rejection of claims 1 and 13-16 above, however Bartholomeusz did not teach cutting (machining by lathe) or polishing the surface of the sputtering target.

JP '125:

JP '125, drawn to a Co-Cr-Pt-B sputtering target, teaches there is a relationship between the surface roughness of a target and the sputtered film deposited on a substrate (para 0004 – 0007) and that the dispersion in magnetic properties of deposited Co-Cr-Pt type layers could be minimized by reducing the surface roughness of the finishing sputtering target to less than 1.50 microns (para 0009 and 0012).

After casting and rolling, the desired low surface roughness may be obtained by cutting on a lathe and altering the feed rate of the cutting bit on the lathe or changing the type of cutting tool (para 0014, 0023, and 0030) to avoid the problem of ground grains on the target surface experienced by prior art cutting/finishing processes (para 0004 and para 0014).

Yamakoshi:

Yamakoshi, drawn to a method of manufacturing a sputtering target which provides excellent uniformity in film thickness and low incidence of occurrence of nodules and particles (col. 1, lines 5-10), teaches that variation in film thickness and the production of particles and nodules are all attributable to conditions of the target surface (col. 1, lines 23-40).

In particular, Yamakoshi determined that the formation of nodules and particles are promoted by residual materials from processing tools such as turning (lathe) tools

which remain on the surface due to abrasion of the tools during machining as well as residual abrasives (col. 2, lines 45-55).

In manufacturing a sputtering target, machining, polishing, and chemical etching are generally used to smooth a surface for controlling surface roughness (col. 4, lines 15-20) and that it is necessary to reduce the thickness of a surface damage layer produced by machining to 50 μm or less (col. 4, lines 34-40).

Use a diamond turning tool can reduce the surface roughness effectively to this end without needing further wet polishing or chemical polishing (col. 4, lines 51-58), however conventional polishing methods can be used to further reduce surface roughness and the thickness of a surface damaged layer (col. 4, line 66 - col. 5, line 2).

Kano:

Kano, drawn to the manufacture of metal silicide sputtering targets that give off a minimum of particles (col. 2, lines 20-25), teaches that the formed sputtering targets are machined to final shape and dimension and have a deformed layer removed and the surface smoothed by a number of methods including polishing (col. 7, lines 5-15). 20 μm – 100 μm are removed from the target strain-free and along with microstructure control, was effective in controlling early-stage particle generation (col. 7, lines 16-20 and 24-34).

Regarding claims 4 and 17, it would have been obvious to one of ordinary skill in sputtering target manufacture, at the time the invention was made, to subject the cast (melted) and rolled sputtering target of Bartholomeusz to primary cutting work to remove 1 mm to 10 mm from the surface and then subsequently removing 1 μm to 50 μm by

polishing as JP '125 taught that the dispersion in magnetic properties of deposited Co-Cr-Pt type layers could be minimized by reducing the surface roughness of the finishing sputtering target to less than 1.50 microns (para 0009 and 0012) and that after casting and rolling, the surface may be finished to the desired surface roughness by cutting on a lathe (para 0014) and surface roughness was changed by altering the feed rate of the cutting bit on the lathe (para 0014, 0023, and 0030). A skilled machinist would be able to adjust the area removed from a rough sputtering target depending on the desired target shape, size, surface profile, and surface roughness. In fact, Kano taught that the formed sputtering targets are machined to final shape and dimension (col. 7, lines 5-15).

As for the subsequent polishing step following machining, Yamakoshi taught that conventional polishing methods can be used to further reduce surface roughness and the thickness of a surface damaged layer after machining (col. 4, line 66 - col. 5, line 2) while Kano taught a deformed layer was removed and the surface smoothed by a number of methods including polishing (col. 7, lines 5-15) where 20 μm – 100 μm are removed from the target strain-free. This, along with microstructure control, was effective in controlling early-stage particle generation (col. 7, lines 16-20 and 24-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed range of material removed from the target surface through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art (Kano), discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

With respect to the amendment to claim 17 adding that "...such that the target surface provides a flat and smooth target face without undulation", the prior art of Bartholomeusz would similarly be expected to have a "flat and smooth target face without undulation" as Bartholomeusz is produced by a substantially similar process including casting and rolling and such rolling would be expected to give a flat and smooth surface without undulation.

Furthermore, the method of Bartholomeusz in view of JP '125, Yamakoshi, and Kano performs cutting by lathe with subsequent polishing, which would similarly be expected to yield a flat and smooth surface without undulation as cutting by lathe at least provides a flat surface (in addition to the rolling performed by Bartholomeusz) and any undulation would be smoothed out by the subsequent polishing step.

Regarding claim 12, JP '125 made it clear that cutting may be performed on a lathe with a cutting tool (para 0014), while Yamakoshi added that machining should be performed with a diamond turning tool (a cutting tool) (col. 4, lines 51-58 and col. 4, line 66 - col. 5, line 2).

8. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Bartholomeusz** in view of **JP '125, Yamakoshi,** and **Kano**, in further view of **Hatwar** (US 4,895,592).

The disclosures of Bartholomeusz, JP ' 125, Yamakoshi, and Kano were discussed above, however none of the references taught that polishing was performed with sandpaper or grindstone having a rough abrasive grit size of #80 to #400.

Hatwar:

Hatwar, drawn to high-purity substantially defect-free sputtering target materials and a method of making them (col. 1, lines 8-12), teaches that the surfaces of the target were polished clean using 240, 320, 400, and 600 grit emery papers (sandpaper) (col. 5, lines 42-51).

It would have been obvious to one of ordinary skill in sputtering target manufacturing, at the time the invention was made, to polishing the sputtering targets of Bartholomeusz processed by the method disclosed in the rejection of claims 1, 4, and 12 above using sandpaper or grindstone with a rough grit of #80 to #400 as Yamakoshi and Kano suggested that the target be polishing after machining to further refine the surface roughness and Hatwar teaches a specific example of a polishing process to clean the surface of the targets with the goal being to produce "defect-free sputtering targets".

Response to Applicant's Arguments:

9. Applicant's arguments filed October 5th, 2009 have been fully considered but they are not persuasive.

Applicants' assertions (p. 6, para 2 to p. 11, para 2 and p. 12, para 4 to p. 13, para 2) with respect to JP '623 are moot in view of the withdrawal of the rejections based on JP '623. Furthermore Applicants attempt (p. 9, para 1) to distinguish the instant invention from the prior art of JP '623 based on "Co-rich phase derived from primary crystals" "Co-rich phase derived from eutectic crystals", neither of which have

any support in the instant specification or originally filed claims or are claimed microstructural features.

Applicants assert (p.11, para 5 to p. 12, para 4) that JP '125 teaches that polishing will cause abrasive grains to become embedded in the target material surface and thus teaches away from polishing.

In response, the instant rejections rely on the full human translation of JP 2002-208125, which never mentions "polishing". A closer look at para 0004 and para 0014 shows that while prior art methods of surface finishing by lathe cutting caused ground particles to embed in the surface of the sputtering target, the low surface roughness sought by JP '125 may be obtained by lathe cutting nevertheless per para 0014, with the caveat that the feed rate is lowered and the proper cutting tool is selected. Furthermore, paragraphs 0023 and 0030 teach embodiments of the invention featuring cutting with a lathe for surface finishing.

Conclusion

-- Claims 1, 4, and 11-17 are rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required,

applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

December 11th, 2009
10-598,502

/George Wyszomierski/
Primary Examiner
Art Unit 1793